

CLAIMS:

1. A drill attachment for coupling a tubular cutting member having a bore to drive means for rotating the cutting member, the drill attachment comprising:

5 a housing defining first and second fluid conduits; and

10 a drive shaft rotatably mounted within the housing and having fluid transmitting first and second end portions in fluid communication with the respective first and second fluid conduits, the first end portion being adapted for coupling to one of a tubular cutting member and a drive means and the second end portion being adapted for coupling to the other of the tubular cutting 15 member and the drive means.

2. A drill attachment as claimed in claim 1, wherein at least one of said first and second end portions of the drive shaft is adapted for coupling to a tubular cutting 20 member when dry drilling is required.

3. A drill attachment as claimed in claim 1 or 2, wherein at least one of said first and second end portions of the drive shaft is adapted for coupling to a tubular cutting member 25 when wet drilling is required.

4. A drill attachment as claimed in claim 1, wherein one of said first and second end portions of the drive shaft is adapted for coupling to a tubular cutting member 30 when dry drilling is required, and the other of said first and second end portions is adapted for coupling to a tubular cutting member when wet drilling is required.

35 5. A drill attachment as claimed in any preceding claim, wherein at least one of said first and second end portions of the drive shaft is adapted for transmitting

dust extracted from the bore of a tubular cutting member, and at least one of said first and second end portions of the drive shaft is adapted for transmitting an appropriate drilling fluid such as water to the bore of a 5 tubular cutting member.

6. A drill attachment as claimed in any preceding claim, wherein one of said first and second fluid transmitting end portions of the drive shaft is adapted 10 for transmitting dust extracted from the bore of a tubular cutting member, and the other of said first and second end portions of the drive shaft is adapted for transmitting water or other appropriate drilling fluid to the bore of a tubular cutting member.

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7. A drill attachment as claimed in any preceding claim, wherein when dry drilling is required, a suction device is coupled to one of the first and second fluid conduits in the housing.

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8. A drill attachment as claimed in any preceding claim, wherein when wet drilling is required, a drilling fluid supply is coupled to one of the fluid conduits in the housing.

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9. A drill attachment as claimed in any preceding claim, wherein one of said first and second fluid conduits is adapted for coupling to a suction device, and the other of said first and second fluid conduits is 30 adapted for coupling to a fluid supply.

10. A drill attachment as claimed in any preceding claim, wherein the drive shaft is bearing mounted within the housing of the drill attachment.

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11. A drill attachment as claimed in any preceding claim, wherein the drive shaft is retained within said housing using circlips.

5 12. A drill attachment as claimed in any preceding claim, wherein the drive shaft comprises a first axial bore which extends partially through the drive shaft from the first fluid transmitting end portion thereof, and terminates at a point within the drive shaft.

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13. A drill attachment as claimed in claim 12, wherein the drive shaft comprises at least one radial bore which extends from the outer surface of the drive shaft and merges with said first axial bore.

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14. A drill attachment as claimed in claim 13, wherein said at least one radial bore merges with the first axial bore in the region of the terminating end of said first axial bore.

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15. A drill attachment as claimed in claim 13 or 14, wherein two radial bores are provided and are diametrically aligned such that a first diametric bore is defined which extends through the drive shaft in a 25 direction normal to the axial direction of the drive shaft.

16. A drill attachment as claimed in any one of claims 12 to 15, wherein the drive shaft comprises a second axial bore which extends partially through the drive shaft from the second fluid transmitting end portion thereof, and terminates at a point within the drive shaft.

30 35 17. A drill attachment as claimed in claim 16, wherein the drive shaft further comprises at least one radial

bore which extends from the outer surface of the drive shaft and merges with said second axial bore.

18. Preferably, said at least one axial bore merges with 5 the second axial bore in the region of the terminating end of said second axial bore.

19. A drill attachment as claimed in claim 17 or 18, 10 wherein two radial bores are provided and are preferably diametrically aligned such that a second diametric bore is defined which extends through the drive shaft in a direction normal to the axial direction of the drive shaft.

15 20. A drill attachment as claimed in any one of claims 13 to 19, wherein the location of said radial bores along the length of the drive shaft is such that said bores are substantially aligned with a respective first and second fluid conduit in the housing.

20 21. A drill attachment as claimed in claim 20, wherein one of said first and second axial bores and associated 25 at least one radial bore in the drive shaft is adapted for transmitting dust from the bore of a cutting member to the respective fluid conduit in the housing.

30 22. A drill attachment as claimed in claim 21, wherein the other of said first and second axial bores and associated at least one radial bore is adapted for transmitting a drilling fluid from the respective fluid conduit in the housing to the bore of a cutting member.

35 23. A drill attachment as claimed in claim 22, wherein the drive shaft comprises fluid seals located on either side of the at least one radial bore through which

drilling fluid may be supplied in order to prevent leakage of said drilling fluid.

24. A drill attachment as claimed in any preceding
5 claim, wherein one end of a tubular cutting member for use with the drill attachment comprises coupling means for coupling to the drive shaft, and another opposite end of the tubular cutting member comprises cutting elements for effecting drilling.

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25. A drill attachment as claimed in claim 24, wherein the coupling means includes threaded coupling means.

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26. A drill attachment as claimed in claim 25, wherein the tubular cutting member comprises a male threaded portion which is received within a female threaded portion provided on an end portion of the drive shaft.

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27. A drill attachment as claimed in claim 25, wherein the cutting member comprises a female threaded portion which receives a male threaded portion provided at an end portion of the drive shaft.

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28. A drill attachment as claimed in any preceding claim, wherein the drive shaft comprises means for preventing rotation within the housing when a tubular cutting member is coupled thereto using a threaded connection.

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29. A drill attachment as claimed in claim 28, wherein the rotation prevention means is in the form of diametrically opposed land portions located at at least one end portion of the drive shaft, said land portions providing gripping means for a tool to restrain the drive shaft from rotational motion.

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30. A drill attachment as claimed in any one of claims 24 to 29, wherein the coupling means of the tubular cutting member is provided on a shank portion associated therewith.

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31. A drill attachment as claimed in claim 30, wherein the shank portion is formed integrally with the cutting member

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32. A drill attachment as claimed in claim 30, wherein the shank portion is independently coupled to the coupling member.

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33. A drill attachment as claimed in claim 30, 31 or 32, wherein the shank portion includes a throughbore permitting fluid transmission between the bore of the cutting member and one of the first and second fluid conduits in the housing when in use.

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34. A drill attachment as claimed in any preceding claim, wherein the drill attachment is adapted for use with a selection of tubular cutting members having various bore diameters.

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35. A drill attachment as claimed in claim 34, wherein the drill attachment is adapted for use with cutting members having bore diameters of around 20 to 250 mm and above.

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36. A drill attachment as claimed in any one of claims 24 to 35, wherein large diameter tubular cutting members, particularly those for use in dry drilling operations, have a plurality of extraction apertures in the base thereof, adjacent to the coupling means.

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37. A drill attachment as claimed in claim 36, wherein tubular cutting members having a bore diameter greater than around 70 mm comprise dust extraction apertures in the base thereof.

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38. A drill attachment as claimed in any preceding claim, wherein where large diameter tubular cutting members are used, an adapter is provided which comprises the coupling means for coupling to the end portion of the 10 drive shaft, upon which adapter the tubular cutting member is mounted.

39. A drill attachment as claimed in claim 38, wherein the adapter comprises a plurality of radially extending 15 mounting pins which are received within engaging slots provided in the tubular cutting member.

40. A drill attachment as claimed in claim 38 or 39, wherein tubular cutting members having a bore diameter 20 greater than around 70 mm are coupled to the drive shaft using an adapter.

41. A drill attachment as claimed in claim 38, 39 or 40, wherein the adapter further comprises a plurality of 25 extraction apertures.

41. A drill attachment as claimed in any one of claims 36 to 40, wherein where dust extraction is effected through extraction apertures, the dust is drawn into a 30 chamber in the housing and through one of the first and second fluid conduits.

42. A drill attachment as claimed in claim 41, wherein the chamber is an annular chamber defined between the 35 outer surface of a portion of the drive shaft and the inner surface of a portion of the housing.

43. A drill attachment as claimed in claim 42, wherein the chamber is located within the region surrounding one of said first and second axial bores in the drive shaft.

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44. A drill attachment as claimed in claim 41, 42 or 43, wherein the chamber is open at one end providing an opening through which dust may be drawn into said chamber.

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45. A drill attachment as claimed in claim 44, wherein only one side of the drilling attachment is adapted for dry drilling when large bore cutting members are used and dust is to be extracted through extraction apertures as well as through a shank portion used to couple the cutting member to the drive shaft.

46. A drill attachment as claimed in any one of claims 41 to 45, wherein the chamber is located at a first side of the drill attachment and is in fluid communication with the first fluid conduit in the housing.

47. A drill attachment as claimed in claim 46, wherein the side of the drilling attachment comprising the chamber is also adapted for use in wet drilling, wherein means are provided for closing the opening through which dust is extracted into the chamber during dry drilling.

48. A drill attachment as claimed in claim 47, wherein such means includes an annular body mounted within the opening, which annular body comprises a plurality of apertures which remain open during dry drilling, but which are closed during wet drilling to prevent leakage of drilling fluid.

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49. A drill attachment as claimed in claim 48, wherein the apertures are selectively opened and closed by use of an annular plate mounted on or within said annular body, which annular plate has corresponding apertures which are 5 aligned with those of the annular body during dust extraction, but which are misaligned with the apertures of the annular body, in order to close said apertures, during wet drilling.

10 50. A drill attachment as claimed in claim 49, wherein a fluid sealing arrangement is provided between the annular body and annular plate in order to maintain sealing integrity and to prevent leakage of the drilling fluid.

15 51. A drill attachment as claimed in any one of claim 41 to 50, wherein the chamber is in selective fluid communication with one of the first and second fluid conduits in the housing, such that a fluid path between the chamber and said fluid conduit is open when dust is 20 extracted through extraction apertures.

25 52. A drill attachment as claimed in claim 51, wherein selective fluid communication between the chamber and the fluid conduit is achieved by use of a sliding collar provided on the housing.

30 53. A drill attachment as claimed in claim 52, wherein the sliding collar is provided on the inner surface of the housing at the location of the chamber.

54. A drill attachment as claimed in claim 52 or 53, wherein the collar is moveable in an axial direction from a first position where the fluid path is closed, to a second position where the fluid path is open.

55. A drill attachment as claimed in any preceding claim, wherein the drive shaft has an annular ring mounted on the outer surface thereof, said ring having substantially the same outer diameter as the inner 5 diameter of the portion of the housing defining the chamber.

56. A drill attachment as claimed in claim 55 when dependent on any one of claims 41 to 55, wherein the ring 10 is aligned with the fluid conduit in fluid communication with the chamber.

57. A drill attachment as claimed in claim 56, wherein the ring is aligned along the centre-line of the fluid 15 conduit in fluid communication with the chamber.

58. A drill attachment as claimed in claim 55, 56 or 57, wherein when the collar is moved to close the fluid path between the fluid conduit and the chamber, that is, 20 towards a first position, a first end of the collar will abut a side face of the ring, therefore closing a portion of the fluid conduit and consequently said fluid path.

59. A drill attachment as claimed in claim 54, wherein 25 when large diameter cutting members are used in dry drilling operations where dust is extracted through the shank portion and extraction apertures, the collar is extended from the housing towards the second, open position, towards the base of the cutting member, wherein 30 the second end of the collar is substantially aligned with the base of the cutting member.

60. A drill attachment as claimed in claim 54, wherein 35 when small diameter cutting members are used in dry drilling operations where dust is extracted through the throughbore in the shank portion only, the collar is

retracted into the housing towards the first position, closing the fluid path between the chamber and the associated fluid conduit.

5 61. A drill attachment as claimed in any one of claims
52 to 60, wherein the collar comprises a plurality of
axially arranged circumferential depressions in the outer
surface thereof, said depressions adapted to receive an
inwardly extending lip provided on the housing.

10 62. A drill attachment as claimed in claim 61, wherein
interaction of the circumferential depressions and the
lip acts to retain the collar in the desired position
such that the collar cannot inadvertently be pushed into
15 or pulled from the housing during a drilling operation.

20 63. A drill attachment as claimed in any one of claims
52 to 60, wherein the collar includes a plurality of
longitudinal ribs circumferentially distributed about the
outer surface of the collar, said ribs defining a number
of depressions adapted to receive an inwardly extending
lip provided on the housing.

25 64. A drill attachment as claimed in any preceding
claim, wherein tubular cutting members used with the
drill attachment may be used in both wet and dry drilling
operations.

30 65. A drill attachment as claimed in claim 64, wherein
large diameter tubular cutting members having extraction
apertures in the base thereof comprise means for blocking
said apertures in order to prevent drilling fluid from
pouring from the bore of the cutting member during a wet
drilling operation.

66. A drill attachment as claimed in claim 65, wherein said blocking means includes plugs which are fitted within the apertures.

5 67. A drill attachment as claimed in claim 65, wherein said blocking means includes a plate rotatably mounted on the cutting member or appropriate adapter, said plate being rotatable to selectively open and close the extract apertures.

10 68. A drill attachment as claimed in claim 65, wherein the blocking means includes a unitary component having a plurality of plugs each formed and arranged to be received within a respective extraction aperture.

15 69. A drill attachment as claimed in claim 68, wherein adjacent plugs of the unitary component may be joined together by a linking member.

20 70. A drill attachment as claimed in claim 69, wherein the linking members serves to provide a means for removing the plugs of the unitary component from the extraction apertures.

25 71. A drill attachment as claimed in any preceding claim, wherein the drilling attachment is adapted to be coupled to a tubular cutting member via an extension portion.

30 72. A drill attachment as claimed in claim 71, wherein said extension portion comprises an elongate tubular member having a throughbore and including threaded portions at either end thereof for coupling to the drive shaft and a tubular cutting member or appropriate cutting member adapter.

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73. A drill attachment as claimed in claim 71 or 72, wherein where large diameter cutting members are used in dry drilling operations and dust is to be extracted through extraction apertures, an additional tubular member is provided which surrounds the extension portion and provides an encased path for dust to be drawn from the bore of the cutting member and into the drill attachment housing.

10 74. A drill attachment as claimed in claim 73, wherein the additional tubular member is coupled to the drill attachment via an appropriate adapter.

15 75. A drill attachment as claimed in any preceding claim, wherein means are provided to secure a pilot drill to the drill attachment.

20 76. A drill attachment as claimed in claim 75, wherein said means for securing a pilot drill to the drill attachment may be provided on the drive shaft at at least one end portion thereof.

25 77. A drill attachment as claimed in claim 75 or 76, wherein the means for securing a pilot drill to the drill attachment comprises at least one grub screw which extends radially through the drive shaft and grips a pilot drill located within one of the first and second axial bores.

30 78. A drill attachment as claimed in claim 77, wherein where the at least one grub screw extends through the drive shaft at a portion of the shaft which is contained within the housing, access to said at least one grub screw may be achieved through one of the first and second fluid conduits in the housing of the drill attachment.

79. A drill attachment as claimed in any preceding claim, wherein the drive means is a drilling.

5 80. A drill attachment as claimed in any preceding claim, wherein the drive means is coupled to the drive shaft by threaded coupling means.

10 81. A drill attachment as claimed in any preceding claim, wherein the drive means comprises a male threaded portion which engages a female threaded portion provided on the drive shaft.

15 82. A drill attachment as claimed in any one of claims 1 to 80, wherein the drive means is coupled to the drive shaft via an adapter.

20 83. A drill attachment as claimed in claim 82, wherein one end of the adapter comprise a male threaded portion adapted to be coupled to the drive shaft, and the opposite end comprises a pin adapted to be received in a chuck of the drive means

25 84. A drill attachment for coupling a tubular cutting member having a bore to drive means for rotating the cutting member, said drill attachment comprising:

30 a housing defining a fluid conduit; and a drive shaft rotatably mounted within the housing and having a fluid transmitting end portion being in fluid communication with the fluid conduit and being adapted for coupling to a tubular cutting member, and a drive end portion being adapted for coupling to drive means, said housing and said drive shaft together defining a chamber having an opening in selective fluid communication with said fluid conduit.

85. A drill attachment as claimed in claim 84, wherein the opening of the chamber in selective fluid communication with fluid conduit is located at the end thereof adjacent the fluid transmitting end portion of 5 the drive shaft.

86. A drill attachment as claimed in claim 84 or 85, wherein the fluid transmitting end portion of the drive shaft is in fluid communication with the fluid conduit 10 via the chamber defined by the drive shaft and the housing.

87. A drill attachment as claimed in claim 84, 85 or 86, wherein the chamber defined by the housing and the drive 15 shaft is an annular chamber.

88. A drill attachment as claimed in any one of claims 84 to 87, wherein the drill attachment is adapted for use in both dry and wet drilling operations.

20 89. A drill attachment as claimed in any one of claims 84 to 88, wherein the fluid transmitting end portion of the drive shaft is adapted for transmitting drilling fluid to the bore of a tubular cutting member.

25 90. A drill attachment as claimed in any one of claims 84 to 89, wherein the fluid transmitting end portion of the drive shaft is adapted for transmitting dust extracted from the bore of a cutting member.

30 91. A drill attachment as claimed in any one of claims 84 to 90, wherein the opening in the fluid chamber is adapted for transmitting dust extracted from the bore of a tubular cutting member.